DATA STRUCTURES

II Semester: CSE / ECE / EEE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS002	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

I. COURSE OVERVIEW:

The course covers some of the general-purpose data structures and algorithms, and software devel- opment. Topics covered include managing complexity, analysis, static data structures, dynamic data structures and hashing mechanisms. The main objective of the course is to teach the students how toselect and design data structures and algorithms that are appropriate for problems that they might encounter in real life. This course reaches to student by power point presentations, lecture notes, andlab which involve the problem solving in mathematical and engineering areas.

II. OBJECTIVES:

The course should enable the students to:

I	The skills needed to understand and analyze performance trade-offs of different algorithms implementations and asymptotic analysis of their running time and memory usage.
II	The knowledge of basic abstract data types (ADT) and associated algorithms:stacks, queues, lists, tree, graphs, hashing and sorting, selection and searching.
III	The fundamentals of Non-linear Data structure to store, retrieve, and processdata efficiently.
IV	The implementing these data structures and algorithms and Understand essentialfor future programming and software engineering courses.
V	Analyze and choose appropriate data structure to solve problems in real world.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Interpret** the complexity of algorithm using the asymptoticnotations.	Understand
CO 2	**Select** appropriate searching and sorting technique for a givenproblem.	Apply
CO 3	**Construct** programs on performing operations on linear and nonlinear data structures for organization of a data	Apply
CO 4	**Make use of** linear data structures and nonlinear datastructures solving real time applications.	Apply
CO 5	**Describe** hashing techniques and collision resolution methodsfor efficiently accessing data with respect to performance.	Understand
CO 6	**Compare** various types of data structures ; in terms ofimplementation, operations and performance.	Analyze

IV. SYLLABUS:

UNIT-I	INTRODUCTION TO DATA STRUCTURES, SEARCHING AND SORTING	Classes: 10

Basic concepts: Introduction to data structures, classification of data structures, operations on data structures, abstract data type, algorithms, different approaches to design an algorithm, recursive algorithms; Searching techniques: Linear search, binary search and Fibonacci search; Sorting techniques: Bubble sort, selection sort, insertion sort, quick sort, merge sort, and comparison of sorting algorithms.

UNIT-II	LINEAR DATA STRUCTURES	Classes: 10
Stacks: Primitive operations, implementation of stacks using Arrays, applications of stacks arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Array, applications of linear queue, circular queue and double ended queue (deque).		
UNIT-III	**LINKED LISTS**	**Classes: 09**
Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation. Types of linked lists: Circular linked lists, doubly linked lists; Linked list representation and operations of Stack, linked list representation and operations of queue.		
UNIT-IV	**NON LINEAR DATA STRUCTURES**	**Classes: 08**
Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary search tree, tree variants, application of trees; Graphs: Basic concept, graph terminology, graph implementation, graph traversals, Application of graphs, Priority Queue.		
UNIT-V	**BINARY TREES AND HASHING**	**Classes: 08**
Binary search trees: Binary search trees, properties and operations; Balanced search trees: AVL trees; Introduction to M-Way search trees, B trees; Hashing and collision: Introduction, hash tables, hash functions, collisions, applications of hashing.		

Text Books:

1. Mark A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson, 2nd Edition, 1996.
2. Ellis Horowitz, Satraj Sahni, Susan Anderson Freed, "Fundamentals of Data Structures in C", Universities Press, 2nd Edition, 2008.

Reference Books:

1. Reema Thareja, "Data Structures using C", Oxford University Press, 2nd Edition, 2014.
2. S. Lipschutz, "Data Structures", Tata McGraw Hill Education, 1st Edition, 2008.
3. D. Samanta, "Classic Data Structures", PHI Learning, 2nd Edition, 2004.
4. Tanenbaum, Langsam, Augenstein, "Data Structures Using C", Pearson, 1st Edition, 2003.

Web References:

1. http://www.tutorialspoint.com/data_structures_algorithms
2. http://www.geeksforgeeks.org/data-structures/
3. http://www.studytonight.com/data-structures/
4. https://www.coursera.org/specializations/data-structures-algorithms

E-Text Books:

1. https://www.scribd.com/doc/268924096/c-Data-Structures-Balaguruswamy-eBook
2. https://www.safaribooksonline.com/library/view/data-structures-using/9789332524248/
3. http://www.amazon.com/Data-Structures-C-Noel-Kalicharan/dp/1438253273
4. https://www.scribd.com/doc/40147240/Data-Structures-Using-c-by-Aaron-m-Tenenbaum-946

Course Home Page: